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### Study of the Insect Pest Complex of Rainfed Rice Crop-Ecosystem of Manipur Valley, India

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#### KEYWORDS

Rice,  
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*Scirpophaga  
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*Cnaphalocrocis  
medinalis*.

#### A B S T R A C T

The replicated field investigations were made to study the insect pest complex at the Rice Research Farm, College of Agriculture, Central Agricultural University, Imphal during *Kharif* season of 2010 and 2011. During the study, about 30 insect pest species were recorded to infest Rice in Manipur and of which Asian gall fly, *Orseolia oryzae* Wood-Mason, Yellow stem borer, *Scirpophaga incertulas* Walker, leaf folder, *Cnaphalocrocis medinalis* Guenee, caseworm, *Nymphula depunctalis*, whorl maggot, *Hydrellia philippina* Ferina, small grasshopper, *Oxya chinensis* Walker, green leafhopper, *Nephotettix virescens*, gundhi bug, *Leptocorisa acuta* T, swarming caterpillar, *Spodoptera mauritia* and Army worm, *Mythimna separata* Walker are of the major importance inflicting the crop.

#### Introduction

Rice, *Oryza sativa* Linnaeus, the grain of life and staple food of more than 60% of the world population is cultivated in 111 countries of the world in varied edaphic and meteorological condition. It is grown under different Agro ecosystem s such as banded uplands and water logged lowlands mostly under rainfed conditions. India has got world's largest rice growing areas with

43.93 million hectares with production of 91.61 million tones (Anonymous, 2001). In Manipur, rice is the staple food of entire population and mainly grown during the *Kharif* season in an area of 1,76,310 hectares, producing 435.9 thousand tones with a productivity of 2413.52kg/ha (Anonymous, 2005). The population of the

state is about 2.39 millions with the total estimated rice requirement of 5.49 lakh tones. Thus, the state has to produce additional rice of about 1.62 lakh tones to meet the requirement of the ever- increasing population of the state.

Though, the average per hectare yield of the state is higher than that of national average, in comparison to other major rice growing states of the country, the *Kharif* rice productivity in Manipur is still low. There is a sharp decline in the overall growth rate of food production from 4.23% during 1967-1978 to 3.77% during 1979-91 and 2.96% during last five years (Paroda, 2006). To meet the demand of the burgeoning population it is of paramount importance that a second breakthrough in food grain production and productivity advance is to be achieved in the country. There are quite a number of biotic and abiotic and socio-economic constraints in production of rice, of which insect pest attack is one of the major cause at various stages of crop growth (Peter, 2015). This crop is attacked by 385 species of insects in India causing 31.5-86.0% losses in yield (Gunathilagaraj and Kumar, 1997).

In Manipur, among the pyralid pests, the leaf folder, yellow stem borer plays a key role in yield reduction (Ram *et al.*, 1981 and Barwal *et al.*, 1994). It was reported that in Rewa District, Madhya Pradesh there were twelve found damaging rice fields during wet season of which Gundhi bug> WBPH> Grasshopper>Stem borer were regular pests, while Hispa> armyworm> horned caterpillar>Rice caseworm were sporadic pests (Mishra *et al.*, 2010). Stem borers, Leaf folders and white backed plant hopper were observed major pests damaging the crop in Basmati rice in the Sheikhpura district of Pakistan (Ramzan *et al.*, 2007)

## **Materials and Methods**

A field experiment was conducted for two consecutive years during kharif season of 2010 and 2011 at the Rice Research Farm, College of Agriculture, Central Agricultural University, Imphal to study the insect pest complex of rainfed rice crop- ecosystem of Manipur. The soil type was clay loam in texture and acidic in reaction having ph value of 5.5. All the recommended agronomic practices for Kharif rice cultivation were adopted for growing the experimental crop.

The experiment was laid out as simple field trial with the susceptible variety 'Leimaphou', one month old seedling were transplanted in 20 cm x 15cm spacing on the first week of July Kharif, 2010 and 2011. The plot size was 50 m<sup>2</sup> areas. Periodic observations on the occurrence of insects was recorded at weekly interval starting from 15 days after sowing of seed (Nursery stage) till crop mature (Main field) on 20 randomly selected hills or one square meter cropping areas of plots during the experimental period. The mean monthly metrological data recorded during the period of investigation are presented in Table 1.

## **Results and Discussion**

Prevailing abiotic factors, particularly temperature, relative humidity and rainfall and bio control agents, viz., parasitoids, predators and entomophilic pathogens, crops and cropping patterns followed and pest resistant/susceptible varieties grown and crop management including fertilizer management practices adopted in a locality are known to exert profound influence on growth and development of arthropod crop pests and their population build up.

**Table.1** Mean Meteorological Data Recorded during the Experimental Period (2010 and 2011)

Month	Temperature (°C)				Relative Humidity (%)				Rainfall (mm)	
	Maximum		Minimum		Morning		Evening		2010	2011
	2010	2011	2010	2011	2010	2011	2010	2011		
May	27.9	28.2	20.1	19.2	89.7	85.8	83.8	68.0	6.2	8.9
June	27.3	29.8	22.0	22.0	94.5	92.2	75.5	80.5	7.9	12.8
July	29.0	30.7	22.7	22.0	92.9	92.3	83.3	77.7	9.6	9.6
August	29.6	30.4	22.6	21.8	92.8	92.9	86.2	77.6	3.3	9.0
September	28.6	30.3	21.6	21.4	93.6	89.4	87.4	70.1	8.7	4.9
October	27.6	28.7	18.5	17.8	92.4	87.3	87.2	61.5	6.3	1.6
November	25.3	27.0	12.7	9.2	90.1	86.2	83.8	47.6	0.4	0.0

**Table.2** Insect Pest Species Observed in Rainfed Rice var. ‘Leimaphou’ during Experimental Years of Kharif, 2010 and 2011

Insect type	Insect species	Order; family	Crop stage	Maximum population/infestation recorded	Pest status
1	2	3	4	5	6
	<b>A. Stem feeder</b>				
1	Gall midge, <i>Orseolia oryzae</i> Wood Mason	Diptera; Cecidomyiidae	Nursery to max. tillering	7 galls/hill	Major
2	Yellow stem borer; <i>Scirpophaga incertulas</i> Walker	Lepidoptera; Pyralidae	Nursery to crop maturity	10 dead heart/hill	Major
3	White stem borer; <i>S.innotata</i> Walker	-do-	-do-	2 dead heart/hill	Major
4	Asiatic rice borer/Rice stripped borer. <i>Chilo suppressalis</i> Walker	-do-	-do-	1 dead heart/hill	Major
5	Pink stem borer; <i>Sesamia inferens</i> Walker	Lepidoptera; Noctuidae	-do-	2 dead heart/hill	Major
	<b>B. Defoliating insects/Foliar feeding insects</b>				
6	Leaf roller; <i>Cnaphalocrocis medinalis</i> Guenee	Lepidoptera; Pyralidae	Nursery to early grain formation	75% leaf damage	Major

7	Rice case worm, <i>Nymphula depuncyalis</i> Guenee	Lepidoptera; Pyralidae	Nursery to crop maturity	10 green cases	Major
8	Rice whorl maggot, <i>Hyderellia philippina</i> Ferina		Nursery to flowering	55% leaf damage	Major
9	Rice horned caterpillar, <i>Melanitis ismene</i> Guenee	Lepidoptera; Nymphalidae	Nursery to flowering	1 larva/20 hills	Minor
10	Rice skipper, <i>Pelopidae methias</i> Fabricius	Lepidoptera; Hesperiidae	Early vegetative to early grain formation	2% leaf damage	Minor
11	Rice hispa, <i>Dicladispa armigera</i>	Coleoptera; Chrysomelidae	Early vegetative to early grain formation	1 adult/sq.m	Minor
12	Small grasshopper, <i>Oxya chinensis</i> Walker	Orthoptera; Acrididae	Nursery to crop maturity	5 hopper/sweep	
13	Surface grasshopper, <i>Atractomorpha crenulata</i> Fabricius	Orthoptera; Acrididae	Nursery to crop maturity	2 hopper/ sweep	Minor
14	Large grasshopper, <i>Hieroglyphus banian</i> Fabricius	Orthoptera; Acrididae	Nursery to crop maturity	1 hopper/sweep	Minor
<b>C. Root feeders</b>					
15	White Grub, <i>Holotrichia longipennis</i> Biench	Coleoptera; Scarabaeidae	Early vegetative to crop maturity	2 adults/50 hills	Minor
16	Mole cricket, <i>Grylotalpa Africana</i> Palisot deuvors	Orthoptera; Grylotalpidae	Nursery to late vegetative	1 cricket/sq.m	Minor
<b>D. Sap suckers/Sucking insects</b>					
17	Rice thrips, <i>Thrips oryzae</i> Willium	Thysanoptera; Thripidae	Nursery to early vegetative	6 thrips/2 sweeps	Minor
18	Green leaf hopper, <i>Nephotettix virescens</i> Distant	Hemiptera; Cicadelidae	Nursery to early grain formation	20 hoppers/2 sweeps	
19	N.nigropictus Stal.	Hemiptera; Cicadelidae	Nursery to early grain formation	5 hoppers/2 sweeps	Minor
20	Zig-zag leafhopper, <i>Racilia dorsalis</i> (Motsch.)	Hemiptera; Cicadelidae	Nursery to early grain formation	5 hoppers/2 sweeps	Minor
21	Brown shield bug, <i>Dolycoris indicus</i> Stal.	Hemiptera; Pentatomidae	Early flowering to soft drought	1 bug/2 sweeps	Minor

22	Rice shield bug, <i>Menida histrio</i> Fabricus	Hemiptera; Pentatomidae	Early flowering to soft drought	1 bug/2 sweeps	Minor
23	Green shield bug, <i>Nezara aviridula</i> Linnaeus	Hemiptera; Pentatomidae	Early flowering to soft drought	2 bug/2 sweeps	Minor
24	Rice black bug, <i>Scotinophara coarctata</i> Thunb.	Hemiptera; Pentatomidae	Early flowering to soft drought	1 bug/2 sweeps	Minor
25	Brown bug, <i>Eusarcocoris guttiger</i> Westw.	Hemiptera; Pentatomidae	Early flowering to soft drought	1 bug/2 sweeps	Minor
26	Coried bug, <i>Riptortus sp.</i>	Hemiptera; Pentatomidae	Early flowering to soft drought	1 bug/2 sweeps	Minor
E	Ear feeders				
27	Rice gundhi bug, <i>Leptocorisa acuta</i> Thunb	Hemiptera; Coriidae	Panicle initiation to grain formation	15bugs/2 sweeps	Major
28	Tobacco/Rice swarming caterpillar, <i>Spodoptera mauritia</i> Boisd	Lepidoptere; Noctuidae	Flowering to grain maturity	10% ear head damage	Major
29	<i>S. litura</i> Linnaeus	Lepidoptere; Noctuidae	Flowering to grain maturity	3% ear head damage	Minor
30	Rice army worm, <i>Mythima seperata</i>	Lepidoptere; Noctuidae	Soft drought to grain maturity	15% ear head damage	Major

In view of the fact that there are variations in weather parameters and natural enemies of crop pests in different places during different seasons every years, variation in insect pests complex over time and space are considered as rule rather than an exception.

Various reasons, viz., delayed monsoon rains, application of high doses of nitrogenous fertilizers, drought with long spells of humid weather, indiscriminate and repeated application of insecticides, etc. has been attributed to the insect pest complex of Rice crop during the period of investigation (2010 and 2011).

During the study, altogether thirty different insect species have been observed inflicting the Rice crop var., 'Leimaphou' starting from germination to crop maturity, of which ten species, viz., Gall midge, *Orseolia oryzae* Wood Mason; Yellow stem borer, *Scirpophaga incertulas* Walker; Leaf roller, *Cnaphalocrocis medinalis* Guenee; Rice case worm, *Nymphula depuncyalis* Guenee; Rice whorl maggot, *Hyderellia philippina* Ferina; Small grasshopper, *Oxya chinensis* Walker; Green leaf hopper, *Nephotettix virescens* Distant; Rice gundhi bug, *Leptocorisa acuta* Thunb; Tobacco caterpillar, *Spodoptera mauritia* Bois and Rice army worm, *Mythima seperata* Walker are the most important and regular pest of this crop in Manipur. The present findings are supported by the results of Ram *et al.* (1981) and Chaudhary *et al.* (2001).

Sontakke and Dash (2000) also reported that recent introduction of rice hybrids caused serious outbreak of many pests of Rice crop in Hirakud Command Area of western Orissa.

Different species of stem borer (*S. incertulas*, *C. suppressalis* and *Sesamia inferens*). Gall midge (*Orseolia oryzae*),

leaf folder (*C.medinalis*), case worm (*N. depunctalis*) and plant hoppers (*Nilaparvata lugens* and *Sogatella furcifera*) are the major pests inflicting severe damage to rice crops, which are encouraging the findings.

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